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THE JOURNAL OF SCHOOL HEALTH

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Vol. XIII FEBRUARY, 1943 No. 2

REPORT OF THE TUBERCULOSIS COMMITTEE OF THE AMERICAN SCHOOL HEALTH ASSOCIATION*

This Committee has been at work since it was appointed by Dr. Keene in 1934. Its various members were selected because of their interest in some special phase of tuberculosis control in the schools of this country. Meetings have been held as often as possible, and in the interims the members have kept in contact through correspondence. The chief objective has been to aid in the creation of an environment free from contagious tuberculosis in the schools of this nation.

Dr. John Ryan of Pomona, New York, who has been a member of our Committee since its organization, in a letter a few weeks before his sudden death, said: "It would seem that our procedures are now fairly well standardized and it is just a question of stimulating the work." Dr. Ryan's statement constitutes the consensus of opinion of the members of the committee. Therefore, a brief review of the standards adopted follows:

Diagnosis — The diagnostic procedures which the committee members recommend are:

1. The administration of the tuberculin test to every person in the entire school system regardless of age.
2. X-ray film inspection of the chests of all adults who react to tuberculin.
3. Adequate clinical and laboratory phases of the examination of all who have shadows on the x-ray film which might be due to tuberculosis.

Tuberculin Test. The committee members strongly recommend Purified Protein Derivative with the usual second dose for those who do not react to the first, or old tuberculin with an initial dose of 0.1 milligram followed by 1.0 if there is no reaction to the first dose. Because of methods of standardization, Purified Protein Derivative is gaining favor. The recent reduction in its

*Presented at the Annual Meeting of the Association at St. Louis, Missouri, October 28, 1942.

cost has partially removed its chief objection. The intracutaneous method of administration has become standard throughout this country and, therefore, is the method of choice. The tuberculin test is best interpreted from forty-eight to seventy-two hours after administration, as slight non-specific reactions have usually disappeared and characteristic tuberculin reactions are still present and usually persist much longer.

Of the non-reactor to tuberculin it can be said that there are no living tubercle bacilli in the body with the following two exceptions:

1. After foci of tubercle bacilli are first established in the body it requires three to seven weeks before the tissues are sensitized so as to cause them to react to tuberculo-protein. This is known as the pre-allergic stage.
2. In some cases of acute or chronic clinical tuberculosis in the terminal stage the tissues apparently become desensitized and thus react slightly or not at all to the usual test doses of tuberculin.

When an individual reacts to tuberculin it may be said with accuracy that there are, or rather recently have been, foci of living tubercle bacilli in the body. Evidence has accrued to show that in some persons all tubercle bacilli die; however, the dead organisms may be sufficient to sustain allergy of the tissues for awhile, but apparently the sensitivity later wanes and finally disappears. Whether this is a matter of months or a year or so, no one knows.

The tuberculin reaction is solely a test for sensitivity of the tissues to tuberculo-protein. It gives no accurate information concerning the presence or absence of immunity. To state that the individual who reacts to tuberculin is immunized against tuberculosis may do great harm. To most persons the word "immunity" means something definite by way of protection against disease. They think of smallpox, in which the immunity produced by an attack or by vaccination is almost absolute. This is not true in tuberculosis for, after all, it is only those persons who have the first attack of this disease who subsequently fall ill and die from it.

The first infection or primary type of tuberculosis is adequate to establish sensitivity of the tissues, and apparently this is not modified by the development of the reinfection or clinical type of the disease. Therefore, one cannot differentiate between the two types by the tuberculin reaction.

The degree of sensitivity of the tissues apparently has no relationship to the extensiveness or seriousness of the disease, as

the individual with only extremely small primary lesions may be highly sensitive to tuberculo-protein while the person with extensive chronic reinfection type of tuberculosis may be less so.

One still hears the statement that approximately 100 per cent of children have the first infection type of tuberculosis and thus react to the tuberculin test by the time they reach the age of fifteen years. One object of the educational work of the tuberculosis committee and the various subcommittees should be to disabuse the minds of the people in this country of such a belief. While it is true that in certain parts of a few of our large cities the incidence of tuberculous infection is high among young adults, the fact remains that in most sections of the country the majority of girls and boys have been protected against tuberculous infection and, therefore, do not react to tuberculin. In some places the percentage of young adults infected with tubercle bacilli is extremely low. In fact, during the past few months seniors in high schools of whole counties have been tested and the incidence of reactors has ranged from 5.5 to 10 per cent. This is a changed situation which is most encouraging to the tuberculosis control movement.

Information concerning this marked decrease in tuberculous infection should be in the possession of everyone. It is probably due to two main activities: first, the almost complete eradication of tuberculosis from cattle so that boys and girls rarely become infected with the bovine type of bacillus and, second, to the early diagnosis and treatment of tuberculosis among humans and the prompt isolation of contagious cases.

The belief is extant that girls and boys of high school age refuse the tuberculin test in such large numbers that it is not worthwhile to attempt it. In recent years this has been proved to be untrue when children themselves and their parents are informed as to the significance and value of the test. Indeed, in whole counties where the senior high school students have been tested, 96 per cent have submitted to the test and most of the remaining 4 per cent were absent the day the test was administered.

The X-ray. Viewing of shadows seen on a fluoroscopic screen or on any kind or size of x-ray film constitutes only one phase of a complete examination. The object of making an x-ray inspection of the lungs is to determine whether any disease or condition is present which obstructs the x-ray sufficiently to cast a shadow on the fluoroscopic screen or the sensitized film. In order to do this an area of disease must be large enough to be within the

range of naked eye vision. Moreover, the microscopic etiology of lesions cannot be determined with accuracy from the gross shadows they cast.

The majority of tuberculous lesions of the first infection type do not attain sufficient size to cast shadows which can be seen by unaided vision, or are in the 25 per cent of the lung which is not visualized on the x-ray film, or are in other parts of the body.

The reinfection type of chronic pulmonary tuberculosis often attains such size as to cast visible shadow, and frequently is located in that part of the lung which is fairly well visualized on the film. In fact, chronic tuberculous lesions often cast shadows before they cause symptoms or abnormal physical signs. Therefore, *the location of an area of chronic disease may be determined by x-ray inspection long before it would be found by any or all other phases of the examination of the living body.* Even though the x-ray shadow is not diagnostic it indicates the necessity for other phases of the examination, such as clinical, laboratory, and in some cases bronchoscopic studies by which the etiological diagnosis can usually be made.

Several methods of making x-ray inspection of the chest have been devised. The simplest and most inexpensive is the use of the fluoroscopic screen. In the hands of experienced physicians all the moderately and far advanced, and many of the minimal lesions may be visualized in this manner. Stiehm developed a fluoroscopic unit with which, by rotating the chest, he could visualize lesions that were not seen on x-ray film because shadows or other structures obscured them from view. The chief objection to fluoroscopic inspection is that no permanent record is made, more than the physician's description of shadow.

The second method of inspecting the chest by x-ray consists of making photo-fluorograms of 35 millimeter films. These are made from images on the fluoroscopic screen and may be viewed singly or stereoscopically. The cost of the film, itself, is small but, unfortunately, special expensive equipment is necessary for exposure which adds materially to the cost of each inspection. An appreciable number of minimal lesions are missed by this method.

The third method consists of making photo-roentgenograms on small film, usually 4 x 5 inches in diameter. They may be viewed either singly or stereoscopically. These films cannot be made with the usual standard x-ray equipment. The cost of the film, itself, is small but the additional equipment necessary is expensive. They are not as satisfactory in detecting lesions as standard-size films.

Inasmuch as special x-ray equipment is necessary for making photo-fluorograms and photo-roentgenograms we can hardly expect our hospitals and physicians' offices to be equipped for such work. Moreover, when evidence of disease is found on these small films those of regular size are recommended. This, of itself, is sufficient evidence that these methods are not entirely satisfactory.

The fourth method consists of making chest exposures on standard-size (14 x 17 inch) celluloid or paper film. Both can be made singly or stereoscopically with excellent results. They can be used on ordinary standard x-ray equipment and, therefore, in any physician's office or hospital. The paper film is a relatively new product but practically every physician who has had extensive exerience with it has found it satisfactory in detecting areas of disease. It is by far the fastest method of making x-ray inspections of the chest. Another distinct advantage is the low cost of the unexposed film.

Comparisons of films by the various methods of the chests of the same individuals have been made to determine their relative value. For example, the Industrial Hygiene Foundation of America, Incorporated, prepared films of the same chests on 35 millimeters stereoscopic, 4 x 5 inch stereoscopic, single films on paper and single films on celluloid. These were viewed by thirty-one persons who have had much experience in x-ray work, to determine the method considered best for various purposes. For survey work 100 per cent considered 14 x 17 inch celluloid film, 97 per cent 14 x 17 inch paper film, 91 per cent 4 x 5 inch film, and 79 per cent 35 millimeter film satisfactory. Other studies have been reported favoring 4 x 10 inch stereoscopic films, which have been much improved in recent months. The question of relative merit is still under study.

Complete Examination. The tuberculin test serves to screen out those with first infection or primary type of tuberculosis. From this group, x-ray inspection screens out those with shadows cast by lesions which may be tuberculous. Thus, these two phases of the examination are only screening processes because lesions casting the shadows are macroscopic and, therefore, the remaining phases of the examination must be done before one can safely arrive at a diagnosis. These remaining phases may include clinical studies and observation, including serial x-ray inspections, bronchoscopic studies, microscopic inspection of sputum and tissue, and not infrequently, animal inoculation. A point of great importance is that no matter how expert one may be by reason of training

and experience it is still necessary to assemble every possible bit of diagnostic evidence by all phases of examination before rendering a diagnosis.

Treatment—Generally speaking, children and members of personnel of school systems who have only the first infection or primary type of tuberculosis do not require treatment except to avoid subsequent exposure to contagious cases of tuberculosis and to be examined periodically in adult life for the reinfection type of the disease.

Those persons found to have chronic reinfection type of tuberculosis should be studied with care to determine whether their lesions are progressive. In many individuals with this type of disease nature has well controlled the lesions, or they may have been successfully treated. Persons with such lesions should not be molested if they are tolerating their work well. However, they should be examined periodically for reactivation of these lesions or for new ones which might develop. Individuals found to have progressive reinfection type of tuberculosis should be given leaves of absence and treated at once. The treatment administered should depend on the severity and extent of lesions. Those with contagious disease should be isolated at once, preferably in sanatoriums.

Activities of the Committee—*State Subcommittees.* Since the committee last reported the subcommittees in most of the states have been enlarged. In fact, we have tried to arrange for three members in each state. The members of the subcommittees in most states have been extremely active in stimulating the control of tuberculosis in the school systems and assembling data for reports.

During the summer two questionnaires were sent to each subcommittee. One pertained to the work that is being done or anticipated among the children, and the other, to work among the personnel of the school systems. Already, many of these questionnaires have been returned, which show that excellent work has been done. During the past year, however, the work has been somewhat handicapped by physicians and others from the various states having entered military service. Nevertheless, those remaining at home are doing their best to continue the work. It is obvious to all that we must continue tuberculosis control activities in the United States, since there is no more important part of the home defense movement. Indeed, we cannot overlook the fact that, in the world as a whole, tuberculosis is still the greatest destroyer of mankind, nor can we overlook the fact that tuberculosis may become contagious, and if contagion is permitted to exist in our

schools and elsewhere, the disease could easily become widespread and, thus, all that has been gained would be lost.

It is the intention of our committee to prepare a map of the United States showing the incidence of infection among high school girls and boys in the various states. However, to date, not enough questionnaires have been received to proceed with this project. From the reports already made by subcommittees it is obvious that a large volume of work is being done in some of our states, showing the importance of continuing the work. For example, in one state it was reported that a bus driver was found to have advanced contagious tuberculosis. During the previous school year he had conveyed to and from school, thirty children. Within the next year or so, six of these children were ill or dead from tuberculosis and practically all of the remainder reacted to tuberculin.

Shortly before his death, Dr. W. J. Ryan of Pomona, New York, submitted a report of school surveys which he had conducted between 1931 and 1934. Among the 16,000 school children he had tested, 40 per cent reacted. Among the reactors, manifest tuberculosis was found in 116. Over this period he had also examined 986 members of school personnel, including teachers, cafeteria workers, etc., and six progressive cases of pulmonary tuberculosis were brought to light.

Jordan* has recently cited a case which emphasizes the great importance of examining high school students. In April 1940, he tested the sixty students in a small high school. Only five reacted; four of these students had x-ray film inspection of the chest. The other reactor, who was a freshman, chose to omit this phase of the examination. In April 1942, when there were sixty-two students in the same high school, fifty-one were found to be reactors. The boy who refused the x-ray inspection two years before was now ill and he was found to have far advanced contagious pulmonary tuberculosis. There is little doubt that this boy's clinical tuberculosis could have been detected one year and probably two years earlier.

One might cite numerous examples from the reports of the subcommittee members throughout the nation. When all the reports are available it is our intention to analyze the data and use it in every possible way to further the control of tuberculosis in the schools of this country as has been done in the past.

Much effort has been put forth to stimulate interest of members of school boards, parents and teacher associations, and the school children in the tuberculosis problem, and its solution. To

* Journal - Lancet, October, 1942.

accomplish this we have collected and analyzed data so as to establish facts and standards in order that the most effective procedures could be carried out by physicians, nurses, and all others participating in the diagnosis, treatment and prevention of tuberculosis.

When our work began there was a widespread movement for complete examination for tuberculosis, of all school children. Several members of our committee were engaged in this work and their own observations, combined with those of others, led to the establishment of some definite facts. For example, it was found that chronic pulmonary tuberculosis rarely develops in the contagious stage in children of grade school age. Moreover, the first infection type of tuberculosis usually is not contagious. Therefore, children in grade school almost never become infected from one another. Obviously, if they are infected, the source of their tubercle bacilli is from adults, such as the members of personnel, high school girls and boys, or from those outside the school environment, including parents and other close associates.

Since children of preschool and grade school age so rarely develop contagious chronic pulmonary tuberculosis the futility of expending time and money in making complete examinations is obvious. The problem in this age period resolves itself into only one phase of the examination, namely, the tuberculin test. This is done to separate the infected from the uninfected in order that: (1) the source of the bacilli of the infected children may be sought among their adult associates and (2) that all infected children be completely examined for tuberculosis periodically on the approach of adulthood and thereafter.

Because clinical chronic pulmonary tuberculosis in the contagious stage makes its appearance more often among children of high school age than it does among those in earlier life, the examination of girls and boys in this age period is important, not only from the standpoint of screening-out the tuberculin reactors, but also for the adequate examination of all reactors. Therefore, high school girls and boys should have the tuberculin test administered. The source of infection of the reactors should be sought among their adult associates. Those who do not react should be retested with tuberculin annually as long as they are non-reactors. The students who react on first testing or at any subsequent time should have x-ray film inspection of their chests. If no shadows are found, this procedure should be repeated annually. If shadows are found on first inspection or at any subsequent time, a careful

examination including the various clinical procedures and laboratory tests should be performed to determine the etiology of the lesion casting the shadow. Those whose lesions are proved to be tuberculous and are progressive should be treated at once.

From the standpoint of contagion, personnel of our school systems is more important than the children. It is well known that as the decades of life increase the incidence of clinical chronic contagious tuberculosis becomes more prevalent. Members of personnel, including teachers, engineers, janitors, bus drivers, and all others are usually in those decades of life when clinical pulmonary tuberculosis is prevalent. The disease, although contagious, often exists without the host having any knowledge of its presence. Often there are no external manifestations such as paleness and weight loss; therefore, in order to detect the individuals who actually have clinical tuberculosis one must examine every member of the personnel of the school system who has any contact, whatsoever, or even frequents the rooms and other places occupied at any time by children. This examination should be identical with that described for high school girls and boys, and for precisely the same reasons.

Contemplated Activities of the Committee,—In order to bring the American School Health Association to the attention of our schools more often and more forcibly, some of the members of the Tuberculosis Committee have suggested that stationery be printed, bearing the names of the officers of the Association, the members of the Tuberculosis Committee and also the names of subcommittee members in each state. This would dignify our work and, at a glance, would reveal an imposing list of persons who are interested in controlling tuberculosis in the schools of this nation.

Another suggestion which seems worthwhile consists of issuing a certificate of recognition for work done in an individual school or system. The members of the committee would be glad to prepare standards and to recommend that the Association certify those schools that qualify. For example, if at least 80 per cent of the children of a school were tested annually with tuberculin and not more than a certain percentage (to be determined by the subcommittee of each state) reacted and a certain percentage of the high school student reactors were completely examined, including films of the chests, that school would qualify as far as this one standard is concerned. A second standard might have to do with examination of personnel. The members of the committee believe this would arouse local pride so as to stimulate

interest, and thus hasten the control of tuberculosis in the schools of this country. It is our opinion that the work of the subcommittee in each sate should include not only public, but also private schools. The issuing of certificates to schools would also call attention to the American School Health Association and increase its prestige. Thus, this Association would be recognized and appreciated for promoting a tangible and definite health enterprise.

In May 1941, when the National Tuberculosis Association held its meeting in San Antonio, Texas, our Committee held a breakfast meeting when five outstanding tuberculosis workers presented short papers on various phases of tuberculosis in the schools. Greatly to our surprise, about sixty-five persons attended this session and many expressed a desire to attend such a meeting annually. A second similar meeting was held in Philadelphia on May 8, 1942. Physicians who participated in the program were, Esmond R. Long of Philadelphia, L. E. Smith of Louisville, Kentucky, L. L. Collins of Ottawa, Illinois, Leo Mynes of Charleston, West Virginia ,and L. S. Jordan of Granite Falls, Minnesota. Approximately 125 persons were present and many were turned away because of lack of room. The papers were so well prepared and presented that many in attendance requested that they be published in full and reprinted. All five papers were published in October 1942, and Miss Louise Strachan of the National Tuberculosis Association, who played the most important role in arranging for the meeting, has ordered a substantial number of reprints for distribution.

The members of the Committee are desirous of holding such meetings annually as many persons became interested in the school tuberculosis problems in this manner.

Wm. P. Brown
Hugh A. Browne
H. A. Burns
H. D. Lees
Esmond R. Long
J. B. Novak
J. A. Myers,
Chairman.

* * * * *

EDUCATION ABOUT TUBERCULOSIS IN THE 'TEEN AGE GROUP

An Educational Project in the Kanawha County Schools

LEO H. MYNES, M.D., F.A.P.H.A.*
Charlestown, West Virginia

We have sought to find a more efficient program in our Kanawha County Schools for teaching about tuberculosis. Beginning in 1936 we began tuberculin testing in our public schools. At this time practically all children tested were in the lower grades, with only "suspects" and known contacts from the junior and senior high schools. This year, 1942, we have exactly reversed the age group tested, confining our work to the secondary schools. We decided to do this after fruitlessly examining hundreds of X-rays of positive children of the age from 6 to 12.

We now believe, and possibly our opinion is shared by others, that children of this latter age are relatively free from the secondary or adult type of tuberculosis. We found numerous cases of evidence of past infection of the primary type, as exemplified by the Ghon complex. These children had apparently made a spontaneous recovery, without any history of tuberculosis infection ever having been diagnosed.

The picture changes, however, in the adolescent boy or girl, particularly in the girl, when tuberculosis, usually a secondary type, is a serious disease and early diagnosis is highly important for successful treatment. The purpose of our program is to teach indelibly that tuberculosis is a germ-caused disease, that it is transmitted by contact, and that early signs and symptoms are often obscure or absent. We teach in addition that there are at least two definite, exact scientific means for its early diagnosis, namely the tuberculin test and the X-ray, and that such cases diagnosed in the minimal stage have an excellent chance for recovery, often denied the late cases.

In 1940, in order to get an inventory of just how much our children of the teen age group knew about tuberculosis, we distributed 5700 copies of questions dealing with the cause, nature, diagnosis, prognosis, and best type of treatment. These questions were essentially those originated and used in a Gallup Survey several years ago. The results of these tests were astonishing in regard to the lack of information these children had about tuber-

*Medical Director, Kanawha County Schools, and President, West Virginia Tuberculosis and Health Association.

culosis, and the amount of misinformation they had about the same disease. Less than 50 per cent knew it is an infectious disease, but gave as its cause, smoking, drinking, and staying up late at night. Thirty per cent believed it to be inherited. A large number thought removal to another climate and altitude an absolute essential to getting well.

As these students presumably came from the better informed homes in each community and in most instances their thought reflected the minds of their parents on this subject, we thought it proper to try to correct this condition in both the homes and in the schools.

THE FIELD

Our county (Kanawha) unit of schools offered a good testing ground. We have approximately 50,000 school children of all ages. There are 32 junior and senior high schools with a population of 15,857, and of this number 9,839 were available for study and educational work. These schools are situated in urban, rural, residential, industrial, mining, and oil producing communities. The negro population is less than 10 per cent. There are no foreign language speaking colonies. The vast majority of students are of English, Scotch, or Irish descent. The economic conditions are probably considerably above the average of the country as a whole.

We begin our campaign by showing talking movies to the school groups. The two most effective have been "Behind the Shadows" and "Let My People Live." These and many others are furnished by the state tuberculosis association and are available at any time from the National Tuberculosis Association. Posters, both the lithographed type and those made by students, were placed in the schools. Some years we have competitive essays. The nurse then makes talks to groups and later invites sensible questions for discussion. This is the build-up for getting the children to take the tuberculin test. This test is never made compulsory; nor do we require the parents' consent for giving it. We assume that when a child reaches the teen age, he or she is old enough to make decisions and assume responsibilities for himself.

The tuberculin test is offered to all incoming students who have not previously had it. It is given to those who have been previously non-reactors. It is not repeated on the previous reactors, who instead are urged to be roentgenographed annually. We are using Old Tuberculin, made up in dilution of 0.1 milligram to 1/10 cc. solution at one of our state hospitals. We prefer it because it is economical, easy to give, and we believe the results to be reliable

which in our hands have been most satisfactory. We give only one injection, the 0.1 milligram dose. Occasionally we get a fairly intense reaction but in over 20,000 tests none has been severe enough to cause concern.

We have found that students are willing to take the test if they are first convinced of its value, and next if they are assured that it will be given quickly. They do not seem to dread the injection nearly as much as the period of anticipation while they are waiting for it. Only after all preparations have been made are the children brought to the testing room. They form a line. The forearm is prepared with alcohol by their classmates, usually the prettiest or most popular girls in the class. The testing team is made up of the school physician and two nurses. One nurse boils the syringes (at least 10) and the needles, using the "vim" Forsbeck needle racks, each of which holds 31 needles. This nurse also fills empty syringes. The second nurse gives her time to changing the needles as they are used after each injection, placing the syringe with sterilized needle directly under the physician's right hand. The physician picks up the syringe with right hand, steadies it with the left and presses the piston down after the needle is inserted, with the left thumb. This two-handed hold on the syringe gives a positive control over it and enables one to give an accurate dose, which is measured by the size of the wheal rather than by the graduation marks on the syringe. The student seats himself on a chair at the end of a table, extending his arm along the edge at a comfortable level. Everything being in readiness, the injection is given quickly and he is on his way sometimes before he realizes he has had the test. We try to keep the line in constant but slow motion all the time. This technic permits giving over 200 tests per hour without undue strain on the testing team. We have found that students tested in this manner are usually in high good humor, joking and laughing, and that fear and hesitancy are practically absent.

It is in the reading of the test that we get our message home to the parents. At the time of reading, we provide the student with a printed sheet of paper, of distinctive color, which he gets just before he comes to the reading room. This page has a space for the child's name, age, grade and school. It also has a space for the parent's name, address, and the name and address of the family physician. Below this are two blank spaces headed "Positive" and "Negative." All of the blank spaces are filled in by the student before he comes to the reading. The reading is made by the physi-

cian and a nurse records the finding, grading the positives as one, two, three or four. Below the above information are two paragraphs, the first being headed: "If your reaction is positive it means ——" . . . then follows a simple, one-syllabled explanation of the reaction, with the urging that an X-ray be made. The other paragraph is headed: "If your reaction is negative it means ——" . . . with an explanation of a negative reaction. This paragraph ends with the words "better be tested ten times than be sorry once." The readings are made at the end of seventy-two hours in order to eliminate false positives. These papers are to go home but not until the information at the top of the page has been copied off for the records. Our purpose in making out an individual sheet for each child is psychological. If we sent literature about the tuberculin test home, or any literature for that matter, in our experience, it seldom arrives there or if it does is tossed aside. By the system we have described, however, we arouse the curiosity of the child and of his parents. They want to know what we did to their child and why? What will happen to his arm and what does it mean, particularly if the reaction is positive? While they are in an inquisitive mood for information we give it to them both by the record sheet and by any other literature we have to distribute. We know that this literature is read, because when younger children from these families reach high or junior high school entrance, the parents, in many instances, request that the child be tested and roentgenographed if positive.

Roentgenographing the Positive Reactors

After the reading we have the positive reactors for a short talk to reassure them, and to urge that they have an X-ray made at the earliest opportunity. We provide this opportunity by engaging a commercial mobile X-ray unit which visits the schools and sets up its apparatus in the gymnasiums. The roentgenograms are made on a roll of sensitized paper. This method has the advantage of dependability, economy and speed, as a hundred films can be made in an hour if the students are prepared. They are processed for reading by the company who returns them to our community where a well known roentgenologist, whose opinion is highly respected by our physicians, makes the interpretation and writes out the report. The report is fastened to the film and it is returned to the student if it is negative. If positive, the X-ray is taken to the child's home and the parents are advised of the condition found and urged to have further examinations made by the family physician or a chest specialist. The total cost of the

X-ray to the student is one dollar. Most students pay this. Some charges are paid for by the Department of Public Assistance, some by the Anti-tuberculosis League; these two agencies incidentally use this method in checking up on their known contacts, both adults and small children. Some schools have a health club, each student who takes the test and the known positive reactors each contribute twenty-five cents. As the total number of positive reactors is seldom over 25 per cent there is enough to pay for all the X-rays needed.

The Follow-Up

All cases who show any lung pathology in this survey are visited by the full-time nurse provided for by the Anti-tuberculosis League. We are fortunate in having a splendidly equipped 45-bed hospital for children, operated by the League, where we can immediately hospitalize any of our cases and follow them through the cure back to their homes by the League's nurse or by one of the school staff nurses.

In the past seven years we find from the record that we have given 20,587 Mantoux tests. The average positive percentage of white students is 17.4. The negro students average 26 per cent positive.

In one small rural high school at the beginning of our program we found 85 per cent of the students positive. This had followed exposure to a senior who was discovered to have had advanced tuberculosis with cavitation. In the intervening years we have checked this school very carefully and now find the incidence below the average in positive reactors. A total of 5,013 roentgenograms have been made by the mobile unit. This number includes 600 teachers who have volunteered for examination. The average annual "find" of active cases of secondary type tuberculosis is five. All of these have been classed as minimal except two. One, a captain of the football squad, had moderately advanced bilateral apical tuberculosis. He made an uneventful recovery. The other, a healthy appearing robust girl, had a cavity over 2 centimeters in diameter. To our knowledge no student in whom we made the diagnosis has died, although several are still under treatment.

Conclusion

We feel that a campaign of this type has some merit. We annually pick up silent cases of active tuberculosis and thus possibly save lives. Because the students "live" through these experiences by actual participation in them we feel that they will be more

likely to remember them and utilize them in later life than if tuberculosis education was presented to them in an academic fashion. We feel, too, that because of their school experience the element of fear will be lessened. This element is a very definite handicap in that many people with tuberculosis are afraid of a roentgenogram and of a diagnosis, and evade one as long as possible, often indeed until what might have been a curable case of tuberculosis becomes incurable.

We feel that in teaching the high school boy and girl of today, we are educating the parents and the leaders of the community of tomorrow, and since health is the most valuable thing we can teach, a sound health program is well worth what it costs.

(Reprinted from the Journal-Lancet of October 1942, page 381.)

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FIRST AID FOR EYE INJURIES*

ARNO E. TOWN, M. D.

Foreign Body in the Eye — The most frequent injury to which the eyes may be subjected is due to foreign bodies. They may lodge in the skin, under the lids, or be imbedded in the outer tissues of the eyeball. They are almost always painful and should be removed as soon as possible. Often they are difficult to locate. First the lower lid should be pulled down, and a search made for a foreign body.

Most people do not know how or are awkward in trying to evert lids. Sometimes they may even do more harm than good, and it is better, whenever possible, to obtain the aid of a doctor. Lastly, the cornea should be examined under good light, using a flashlight in emergency. A foreign body which is located under the lids may be easily removed with a cotton applicator or clean tissue or edge of a clean cloth. However, if the foreign body is imbedded in the cornea, care must be exercised not to injure the delicate corneal tissues. No attempt should be made by lay persons to remove a foreign body from the cornea. The patient should be referred as soon as possible to a doctor, who will make the procedure painless by instilling a local anesthetic, and then removing the foreign material with an instrument. After this procedure, the eye should always have a patch over it until the wound is healed.

Black Eye — Hemorrhage into the eyelids results from contused wounds. The appearance of the "shiner" or "black eye" as a result of blows about the eye is familiar to all. The blood and serum may travel across the bridge of the nose to produce swelling of the lids of the other eye. The prevention of extravasition of blood and serum into wounded tissues consists in the careful application of pressure and cold immediately after the injury. The devitalized tissues must not be iced or refrigerated too much, as gangrene and sloughing have been known to occur. Cold applications may be used for twenty-four to thirty-six hours, but not continually. Immediately after this initial period, when extravasition has ceased, absorption of the blood and debris is hastened by the application of warm compresses. A useful prescription for the purpose is as follows:

1. Anoint the skin around the eyes with lanolin.
2. Apply hot compresses of epsom salts (1 tablespoon to 1 pint of water) every ten minutes.

*Reprinted from the Sight Saving Review, September, 1942, page 163.

3. Apply cool compresses of sodium bicarbonate (1 teaspoon to 1 pint of water) every five minutes.
4. Eyewash with an eye-cup.

There is no point in trying to aspirate the blood as it is distributed through the soft tissues. Application of leaches, beefsteak, or other popular remedies is of little value and may be dangerous, as infection may be introduced.

Penetrating Wounds of the Eyeball — Are always serious and require immediate aid by an eye surgeon. The first-aid treatment consists in covering the eye with a sterile piece of gauze or an eye patch, which is gently fastened down with adhesive tape. The patient should recline during removal to the hospital or doctor.

Burns — Most thermal burns affect only the skin of the lids, singeing the lashes but not burning the cornea or conjunctiva, because of the rapidity of the reflex of the lids. If the effect is only on the skin, the condition will heal simply through the application of vaseline or boric ointment. If the burn is deeper or of second degree, there will usually be contraction because of the thinness of the skin of the lids. In third-degree burns, such as are seen after terrific flash burns of gasoline explosions in auto or aeroplane accidents, the explosion is so rapid that the victim has not time to close the lids; hence the conjunctiva and cornea are involved and the heat is so extreme that the skin and the lid margins may be lost, producing severe deformities.

Chemical Eye Burns — Chemical burns, such as those due to lye, lime, acids, or various refrigerants, act similarly to those caused by heat. The chemical should be removed by neutralization if possible. Theoretically, an alkali burn — such as lye — should be washed out with a weak acid, such as boric acid (one-half teaspoonful to a glass of water); and an acid burn should be washed out with a solution of baking soda. However, valuable time must not be lost in choosing the proper agent, but the corrosive should be removed by copious washing with water, if necessary, placing the eyes under a hydrant or immersing in water. After this first procedure, a doctor or a qualified nurse should look at the eyes for any remaining substance, everting the lids if necessary, as in the case of lye or lime burns, when a small particle tucked under the upper lid can do considerable damage to the cornea.

The immediate concern in the care of severe chemical burns is protection of the globe. Non-irritating oils, greases, and ointments should be used. Albolene and petrolatum, olive oil, lanolin,

mixed or made up into bland ointments, are very useful. Protecting shields of metal or of the new cellulose compounds maintain the moisture of the cornea. The after-care will depend upon the indications, and should be under the guidance of an ophthalmologist.

Since serious permanent opacity often results from chemical burns, particular caution is urged in regard to domestic lye, building lime, refrigeration gases and fluids, battery acids, solvents, and paint and varnish removers. These and others should carry a special warning on the container stressing the danger to the eyes. The effect of the injury is always instantaneous and is serious if much of the caustic splashes in the eye. Often there is nothing effective that can be used to offset the action of the chemical even though the patient be seen immediately.

Ulceration of the Cornea — Following minor trauma may be serious in its end-results of opacity and diminution of vision. The value of closure of the eye by a protective dressing for promotion of healing in the treatment of erosion of the cornea should not be forgotten. Local antiseptics are likely to be irritating to the eye and, in the concentrations in which they may be employed, are generally not very useful in destroying bacteria. It is fortunate that the tissues and secretions of the eye have a protective action in this regard, which accounts in most instances for the remarkable freedom from infection after trauma. Multiple foreign particles, as in powder burns, require several repeated efforts for complete removal.

Chemical Gas Burns — In chemical warfare certain gases will cause more damage to the eyes than to any other part of the body. These gases are phosgene, chlorine, lewisite, and mustard. In the present world conflict, if gas is used, it will probably be disseminated by aeroplane spray, and the civilian population, especially if unguarded by gas masks, will suffer.

In case of a gas attack, get out of the contaminated atmosphere or area as soon as possible. Gases tend to travel downwind. If gas has been released in your immediate vicinity by bomb explosion or spray, move upwind. If gas has been released upwind from you, move across the wind till you are out of the stream.

Most agents are heavier than air and tend to settle in hollows. Therefore, avoid low places or basements. The second story of a building as practically safe. Close doors and windows, stuffing cracks and chimneys; this will keep gas out for hours. If windows are blown out by explosions, hang wet blankets over opening to keep gas from blowing in. The blankets should be fastened tight at the edges.

Lewisite gas in the eyes may cause blindness. Until neutralized or removed, Lewisite continues to penetrate, burning through the skin into muscle or other body tissue. It differs in this respect from mustard, which never penetrates beneath the skin unless carried into a wound by contaminated shell or bomb fragments.

In contradistinction to the treatment of thermal burns of the eye, oils and ointments should never be instilled as they may absorb the gas and keep it pent up between the lids. The eyes must be treated immediately and repeatedly with irrigations of a 2 per cent solution of sodium bicarbonate or baking soda — one-half teaspoonful to a glass of water.

Tear gases are substances which produce severe but temporary eye irritation. Permanent damage rarely results. Many other chemical warfare agents also irritate the eyes but require greater concentrations than the tear gases. The tear gases, however, may cause panic in an uneducated population that does not understand their relative harmlessness and the rarity of serious after-effects.

Exposure to tear gas immediately produces spasm of the eyelids, with sensitiveness to light, inability to open the eyes, copious tearing, and some irritation to a freshly shaven face. If the solution itself gets into the eyes, there may be permanent damage.

The individual should be removed from the contaminated air and face the wind with the eyes open. If irritation is marked, the eyes may be irrigated with boric acid or a 2 per cent solution of sodium bicarbonate (baking soda). The eyes must not be rubbed or bandaged.

If a person has been gassed, the first-aid treatment consists in free irrigation of eyes and prompt removal of the patient to a hospital on a stretcher, as any undue exertion may prove fatal.

In conclusion, it is well to quote again from the opening paragraph, "First aid is the immediate, temporary treatment given in case of accident or sudden illness before the services of a physician can be secured," and to add the caution that whoever gives first aid should first wash hands with soap and water.— The Sight-Saving Review; September, 1942; Volume XII, Number 3; pp. 163-167.

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EDITORIAL

In the Journal of School Health for January, 1943, is an abstract on "The Medical Curriculum", taken from the New England Journal of Medicine. This is worthy of the thoughtful reading of every physician and of every worker in the field of school health. While it does not decry work in research and the training of research workers, it does criticize the failure of medical schools to give their students a more general training so that they may be more generally useful to the profession, to the public, and to the nation.

What the schools and public health departments most need is men and women physicians who have a broad general training and experience, so that they may meet more adequately the multiplicity of problems in diagnosis, in health service, and in public health which appear in a daily continuous stream in any school health effort. This need demands the general practitioner, including the general practitioner who has most emphasized in his training and experience the health problems of children. These physicians we call pediatricians, but they are specialists only in that they give most of their attention to an age group, not to a particular part of the body or to some special sense.

The writer, in his training and hospital experience, particularly emphasized orthopedic surgery. His first case in private practice, however, was a twelve year old girl with scabies. The diagnosis, and of course, the treatment of this case, had been "muffed" by an older physician who claimed to be a specialist in internal medicine. Since the girl's itch was on the outside, perhaps

the "internist" was excusable.

A few years ago, when a leading pediatrician was asked why he had resigned from the faculty of a well known School of Medicine, which was dominated by a university President whose judgment of the worth of faculty members was based largely on whether they had engaged in "productive writing", that is on reports of research, he said he was tired of faculty quarrels, that the majority of the faculty seemed to have forgotten the purpose for which the School of Medicine was established, namely "to train doctors to take care of the sick".

Perhaps one of the advantages we shall reap from this war will be a more broad training of our young physicians; one which will enable them to stand on their own feet instead of being tied to the apron strings of a technician in a laboratory; one which will not tend so strongly to pull them into large centers of population; one which will place good medical service within the financial reach of the average family; one which will make them more generally useful to their fellowmen. C. H. K.

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ABSTRACTS

Interscholastic Athletic-Insurance—This is a most interesting paper and gives some rather pertinent suggestions as to what may be expected in the way of accidents on the football field, as well as ways to protect against them, and treatment, when necessary.

Something over four years ago, a School Health Committee was appointed by the local Medical Society. This in conjunction with a committee of the local schools representing health, physical education, and recreation worked out plans for insurance and the taking care of other casualties. As a result of the work of this committee, arrangements were made to implement the eight points recommended by the Medical Committee, which are as follows:

1. A competent examination before participating in a sport.
2. Elimination of the physically unfit either permanently, or until the disability has been corrected.
3. First aid facilities available on the field for the hazardous sports.
4. Elimination of the injured from practice or game participation for as long as is necessary to insure a maximum of permanent recovery.
5. Pregame inspection and medical care provided for football contests.

6. Records of injuries kept and reviewed from time to time to ascertain results and discover ways and means of improving student health.
7. After care by a physician chosen by the family.
8. In case the injury created a dental problem, the same type of care as in item (7) by the family dentist.

It was apparent that the first step in this program would be the unifying of all athletic programs of the various high schools under one head. This was agreed to, and a director was appointed who was directly responsible to the Superintendent of Schools.

The insurance program was worked out so that all doctors and dentists in the area agreed to take care of any injury up to $300.00 expense. Further than that, whatever was left over was to be prorated toward any unpaid fees. For example, a fee of $100.00 might be charged, but due to lack of funds perhaps only 60% could be paid. This was accepted since all shared alike. After one year's experience, the Medical Society made the following recommendations, in brief:

1. Football is most dangerous of competitive sports. Emphasis should be placed on the care of the players.
2. Many returning to schools in the fall were not in proper condition; there should be at least one week of conditioning before scrimmage.
3. Most injuries occur after long practice or in final period of game. Should avoid as far as possible over-fatigue.
4. It is important that cleanliness be observed, and that boys be provided with sufficient clean towels.
5. Should not return too soon after injury of any kind, and then only on the advice and approval of the doctor.
6. Surveys should be made to determine type of injury and, as far as possible, cause.
7. A warm-up period of three minutes before any team participates in a game.
8. The age and weight of players should be as nearly uniform as possible.
9. If there are not sufficient reserves due to small turn-out for football, team should not engage in competitive games.
10. A more uniform method for taping ankles, wrists, and knees should be adopted on the advice of a qualified doctor.

This plan as described in the article seems to have many outstanding and valuable reasons for its existence, among them being the hospital and medical care received on an insurance basis, the

cooperation of the local medical authorities and the schools, in which there seems to have been general satisfaction evidenced by all parties concerned. The Portland, Oregon, Interscholastic Athletic-Insurance Plan, by Eldon I. Jenne, American School Board Journal. August, 1942, page 25. Abstracted by C. L. Outland.

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Nutrition Discussions at the APHA Meetings,—*Rationing in Great Britain*—Despite the war and rationing for the entire population, it is believed that the people of Great Britain are as well or even better fed now than in prewar times, according to Sir John Boyd Orr, Director of the Rowett Research Institute, Scotland. Addressing the Food and Nutrition Section of the American Public Health Association at the recent St. Louis meeting, Sir John said that this favorable condition may be attributed to increased production of food at home, careful planning of imports, equitable distribution and communal meals.

At the beginning of the war, he went on to say, Britain imported two-thirds of her food supply. Today two-thirds of her food supply is produced at home. Milk production has increased substantially, production of potatoes has doubled and sufficient beets are grown to supply all of the nation's sugar needs. Every family is encouraged to grow food, even if only in window boxes.

Imports are carefully selected on the basis of nutritive value, shipping space and with reference to home production, and consist largely of wheat, butter, bacon, dried eggs and milk, meat and fruit juices. Dehydrated foods are an important part of the nation's food supply.

Equitable distribution is effected by rationing all food except bread, vegetables, organ meats, and a few other items. Certain foods are subsidized, and the retail prices of some are kept at prewar levels or even below. Special provision is made for mothers and children, and for the poor.

Every factory employing more than two hundred workers must provide communal meals. All schools serve lunches, and there are many civilian public restaurants where it is possible to obtain at least one meal a day rich in vitamins and minerals. Mothers and children get relatively richer meals with priorities for milk up to one and one-half pints a day. The consumption of oatmeal has increased 75 per cent, and of potatoes, vegetables and milk 30 per cent since prewar times. White bread is no longer available. These facts show that with careful planning the nutritional status of the people can be kept at a satisfactory level even in time of war.

Soil Depletion and Food Values — Dr. Ouida Davis Abbott, of the University of Florida, reported an interesting study based on the concept that the nutritional status of rural people gives more conclusive evidence of soil deficiencies than chemical analysis of either the plants or soil. In the course of the study, the nutritional condition of 3503 rural children was determined, the endemic nature of anemia noted and associated with soil and plant deficiences. In sections where local cattle ranges were classed as deficient in "salt lick" of cattle, the children had lower hemoglobin values than in sections where the ranges were classed as healthful. Also in areas deficient in this respect, functional heart defects were much higher than in the nondeficient areas.

Roentgenograms of the wrists of selected children of the same sex and age showed considerable variations in bone age and development. Children with skeletal imperfections came from sections where cattle also had poor bone formation and suffered from other nutritional defects. Young rats whose only food was milk from these poorly nourished cows soon showed symptoms of malnutrition and died unless a mineral supplement was added to the diet.

Another interesting fact reported by Doctor Abbott was that the iron content of pot herbs grown on different types of soil varied widely. When produced on soils classed as protected, greens contained from two to three times as much iron as when grown on deficient soils.

Vitamin Losses During Storage of Dehydrated Vegetables — A paper by Dr. Donald K. Tressler, Dr. James C. Moyer and Katherine A. Wheeler, New York State Agricultural Experiment Station, Geneva, pointed out that while it is of great importance to produce dehydrated vegetables without marked loss of vitamins during preparation and dehydration, it is equally important to prevent considerable losses during the period between dehydration and consumption. Since the last war, it has been found that both vitamin A and vitamin C are retained better in dehydrated vegetables if the enzymes are inactivated.

Vitamin Losses in Cooking Dehydrated Vegetables — Drs. F. Fenton and B. Barnes, of Cornell University, reported a study made in collaboration with Tressler, Moyer and Wheeler on losses of vitamins which may occur during the cooking of dehydrated vegetables. Four commercially dehydrated vegetables — beets, cabbage, potatoes, and rutabagas — were cooked in family and in quantity amounts, and the losses of certain vitamins ascer-

tained. Varying the temperature of the water in which the cooking of the vegetables was started from 20 to 98 degrees C. made no appreciable difference in the percentage of thiamine retained in the vegetable, dissolved in the cooking water, or destroyed. On the other hand, an increase in the amount of cooking water from the minimum for each vegetable caused a marked and consistent decrease in the amount of thiamine retained in each vegetable and an increase in the amount dissolved in the cooking water.

Increasing the temperature of the water at which cooking of the unblanched, dehydrated cabbage was started from 20 to 98 degrees C. increased the retention of ascorbic acid in the cabbage from 28 to 71 per cent, and decreased the destruction from 60 to 11 per cent. When the cabbage was cooked without refreshing, after thirty minutes and after sixty minutes refreshing, retention of ascorbic acid in the cabbage was 28, 19 and 7 per cent respectively; destruction was 60, 78, and 90 per cent respectively. Increasing the amount of cooking water increased the amount of ascorbic acid dissolved in the cooking water.

When the amount of cooking water for rutabagas was increased, the retention of carotene was decreased.

When steamed in quantity, retention of thiamine in beets, cabbage, potatoes and rutabagas was 82, 88, 87 and 74 per cent respectively. The remainder of the thiamine was dissolved in the small amount of cooking water present. No appreciable amount of thiamine was lost from the steamed vegetables when they were held in a steam-heated warming oven one hour. Steaming was not a satisfactory method of cooking the cabbage and rutabagas from the standpoint of palatability. (Health News, New York State Department of Health, Dec. 21, 1942, pp. 215-16.)

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MEETINGS

American Association for Health, Physical Education, and Recreation with Midwest District Meeting at Cincinnati, Ohio, April 13-16, 1943.